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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/888,363

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Kong Lam Song

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07/08/2004

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EXAMINER

KIM, CHONG R

ART UNIT

PAPER NUMBER

2623

DATE MAILED: 07/08/2004

3

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/888,363

Applicant(s)

SONG, KONG LAM

Examiner

Charles Kim

Art Unit

2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 2.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 1-4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation “the **second** lead frame image and the **second** die image fails to match the **first** lead frame image and the **first** die image” in lines 11-13. There is insufficient antecedent basis for this limitation in the claim. A similar rejection is also applicable to claim 4.

Referring to claim 3, the phrase “computer for storing the stored lead frame image and the stored die image” in lines 3-4 renders the claim indefinite because it is unclear if the lead frame image and the die image is stored twice (stored once and then stored again in the computer), or if it is stored once in the computer.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Art Unit: 2623

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 5-7 are rejected under 35 U.S.C. 102(e) as being anticipated by Nichani, U.S. Patent No. 6,563,324 ("Nichani").

Referring to claim 5, see the discussion of at least claim 1 above. Nichani discloses a method for operating a die bonding apparatus, the method comprising:

a. storing a first lead frame image and a first die image [col. 6, lines 30-66. Nichani discloses the step of storing a first die image, but does not explicitly disclose the step of storing a first lead frame image. However, Nichani explains that the inspection process can be performed for both the IC die and the lead frame; wherein the inspection process comprises the steps of capturing a runtime image and comparing the captured (runtime) image with the stored (training) image. Therefore, applying the inspection process to the lead frame comprises the step of storing a first lead frame image]

b. capturing a second lead frame image and a second die image corresponding to a lead frame and an IC die received by the die bonding apparatus [col. 6, lines 30-66 and col. 8, lines 32-67. Nichani discloses the step of capturing a second die image, but does not explicitly disclose the step of capturing a second lead frame image. However, Nichani explains that the inspection process can be performed for both the IC die and the lead frame; wherein the inspection process comprises the steps of capturing a runtime image and comparing the captured (runtime) image with the stored (training) image. Therefore, applying the inspection process to the lead frame comprises the step of capturing a second lead frame image]

Art Unit: 2623

c. comparing the second lead frame image with the first lead frame image and the second die image with the first die image [col. 8, lines 50-67. Nichani discloses the step of comparing the second die image with the first die image, but does not explicitly disclose the step of comparing the second lead frame image with the first lead frame image. However, Nichani explains that the inspection process can be performed for both the IC die and the lead frame; wherein the inspection process comprises the steps of capturing a runtime image and comparing the captured (runtime) image with the stored (training) image. Therefore, applying the inspection process to the lead frame comprises the step of comparing the second lead frame image with the first lead frame image]

d. terminating the bonding process if one of the second lead frame image and the second die image fails to match the first lead frame image and the first die image, respectively (col. 8, lines 28-31 and col. 9, line 37-col. 10, line 3).

Referring to claim 6, Nichani further discloses the step of detecting a lead frame received by the die bonding apparatus (col. 6, lines 31-66. Note that performing the inspection process for the lead frame comprises the step of detecting a lead frame).

Referring to claim 7, Nichani further discloses the step of detecting a die received by the die bonding apparatus (col. 6, lines 31-66).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2623

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-4, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nichani, U.S. Patent No. 6,563,324 ("Nichani").

Referring to claim 1 as best understood, Nichani discloses a die bonding apparatus for bonding an integrated circuit (IC) die onto a lead frame, the apparatus comprising:

- a. a camera (10) for capturing a lead frame image corresponding to the lead frame and a die image corresponding to the IC die (col. 6, lines 29-60)
- b. an automatic image matching system for comparing the captured lead frame image with a stored lead frame image, for comparing the captured die image with a stored die image [col. 6, line 61-col. 7, line 13 and col. 8, lines 32-67. Nichani discloses that the captured die image is compared with a stored die image, but does not explicitly disclose the step of comparing the captured lead frame image with a stored lead frame image. However, Nichani explains that the inspection process can be performed for both the IC die and the lead frame; wherein the inspection process comprises the steps of capturing a runtime image and comparing the captured (runtime) image with a stored (training) image. Therefore, applying the inspection process to the lead frame comprises the step of comparing the captured lead frame image with a stored lead frame image], and for generating an error signal if one of the captured lead frame image and the captured die image fails to match the stored lead frame image and the stored die image, respectively (col. 9, line 37-col. 10, line 3. Note that the captured (runtime) lead

Art Unit: 2623

frame/die image fails to match the stored (training) lead frame/die image when it is recognized that a “defect” exists in the lead frame/die).

Nichani does not explicitly disclose two separate cameras for capturing the lead frame image and the die image. However, Official notice is taken that using two cameras for capturing images of two different objects was exceedingly well known in the art. Therefore, it would have been obvious to include a second camera in the apparatus of Nichani. The suggestion/motivation for doing so would have been to increase the efficiency and enhance the flexibility of the imaging process.

Referring to claim 2, Nichani further discloses that the auto matching vision system comprises a vision board for digitizing images received from the camera (col. 6, lines 31-45).

Referring to claim 3 as best understood, see the rejection of at least claim 1 above. Nichani further discloses a computer for storing the stored lead frame image and the stored die image, and for comparing the stored (training) lead frame image and the stored (training) die image with the captured (runtime) lead frame image and the captured (runtime) die image, respectively (col. 8, lines 32-67 and figure 1).

Referring to claim 4 as best understood, Nichani further discloses a signal controller for transmitting an error signal to the die bonding apparatus in response to a control signal generated by the computer when one of the captured lead frame image and the captured die image fails to match the stored lead frame image and the stored die image, respectively (col. 8, lines 28-31 and col. 9, line 37-col. 10, line 3).

Referring to claim 8, Nichani discloses a method for bonding an integrated circuit (IC) die onto a lead frame, the method comprising:

Art Unit: 2623

a. storing a first lead frame image and a first die image [col. 6, lines 30-66. Nichani discloses the step of storing a first die image, but does not explicitly disclose the step of storing a first lead frame image. However, Nichani explains that the inspection process can be performed for both the IC die and the lead frame; wherein the inspection process comprises the steps of capturing a runtime image and comparing the captured (runtime) image with the stored (training) image. Therefore, applying the inspection process to the lead frame comprises the step of storing a first lead frame image]

b. capturing a second lead frame image and a second die image corresponding to the lead frame and the IC die to be bonded [col. 6, lines 30-66 and col. 8, lines 32-67. Nichani discloses the step of capturing a second die image, but does not explicitly disclose the step of capturing a second lead frame image. However, Nichani explains that the inspection process can be performed for both the IC die and the lead frame; wherein the inspection process comprises the steps of capturing a runtime image and comparing the captured (runtime) image with the stored (training) image. Therefore, applying the inspection process to the lead frame comprises the step of capturing a second lead frame image]

c. comparing the second lead frame image with the first lead frame image and the second die image with the first die image [col. 8, lines 50-67. Nichani discloses the step of comparing the second die image with the first die image, but does not explicitly disclose the step of comparing the second lead frame image with the first lead frame image. However, Nichani explains that the inspection process can be performed for both the IC die and the lead frame; wherein the inspection process comprises the steps of capturing a runtime image and comparing the captured (runtime) image with the stored (training) image. Therefore, applying the

Art Unit: 2623

inspection process to the lead frame comprises the step of comparing the second lead frame image with the first lead frame image].

Nichani does not explicitly disclose the step of bonding the IC die onto the lead frame only if the second lead frame image and the second die image match the first lead frame image and the first die image, respectively. However, the Examiner notes that this would have been an obvious feature in Nichani for at least the following reasons. Nichani explains that the bonding process is terminated if one of the second lead frame image and the second die image fails to match the first lead frame image and the first die image, as noted above. Note that if the second lead frame image and the second die image matches the first lead frame image and the first die image respectively, the lead frame and die are not considered to have a defect. Therefore, it would have been obvious to perform the bonding process only if the second lead frame image and the second die image matches the first lead frame image and the first die image. The suggestion/motivation for doing so would have been to bond only the lead frames and dies that are non-defective, thereby enhancing the efficiency and increasing the cost effectiveness of the bonding apparatus.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Okazaki U.S. Patent No. 5,646,681 discloses a bonding inspection apparatus that captures an image of a die to be bonded and determines the parts data from the captured image for comparison with stored parts data.

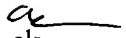
Art Unit: 2623

b. Guest et al. U.S. Patent No. 6,252,981 discloses a method for determining an appropriate reference die image.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Kim whose telephone number is 703-306-4038. The examiner can normally be reached on Mon thru Thurs 8:30am to 6pm and alternating Fri 9:30 to 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on 703-308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


ck

July 6, 2004


Jon Chang
Primary Examiner